



Wildlife Program

*Washington Department
of Fish and Wildlife*

Cougar Research & Management Update

WDFW Commission Meeting

March 18 2016

Presented By:

Rich Beausoleil

Bear & Cougar Specialist



PRESENTATION OVERVIEW



- **History of cougar management**
- **Research topics - past 15 years**
- **Research products**
- **Management structure**
- **Inter-agency data comparison issues**
- **Overview of the past 4 hunt seasons**





HISTORY OF COUGAR MGMT IN WA



- **1966 – Classified as a protected game species**
- **1970 – Mandatory reporting began**
- **1977 to 1986 - ~ 70 day general hunting season**
- **1985 – Tooth collection from mortalities began**
- **1987 to 1995 - ~ 60 day permit-only hunting season**
- **1996 – I655 –voters banned hunting with hounds**
- **1997 to 2008 - 227 day general hunting season**
- **2000 to 2011 - legislature approved hunting with hounds by permit only**
- **2003 - DNA collection from all mortalities began**
- **2004 – Cougar hotline & harvest guidelines implemented**
- **2009 to 2014 - 212 day general hunting season**
- **2015 - 242 day general hunting season**



COUGAR: A CAT OF MANY NAMES



Sexual Dimorphism

Males: 120-190 pounds (adult avg = 140 lbs)

Females: 80-120 pounds (adult avg = 90 lbs)



COUGAR RESEARCH IS CHALLENGING





WA COUGAR RESEARCH TOPICS



- **Social organization**
- **Abundance & density**
- **Growth rate**
- **New biopsy dart technique**
- **Habitat & space use**
- **Source-sink management**
- **Using DNA to evaluate field ID of sex**
- **Older age structure and territoriality**
- **Genetic structure**
- **Harvest rate**
- **Resource selection**
- **Differential prey use**
- **Effects of hunting**
- **Demographics**
- **Immigration & emigration**
- **Management throughout western North America**
- **Staff response guidelines**



PRODUCT - USING BEHAVIOR FOR MGMT



Not a new idea – albeit a different application

- **Cargill – raising cattle since 1865**
 - 126 years later, in 1991, Dr. Temple Grandin approached them with an idea



- Using cattle’s behavior for mgmt “she revolutionized the industry”. Thinking outside the box
- **WDFW– managing cougars since 1966**
 - 47 years later, WDFW using behavior to improve management & preserve social stability
 - Like Cargill, WDFW is leading rather than following



WA COUGAR RESEARCH PROJECTS

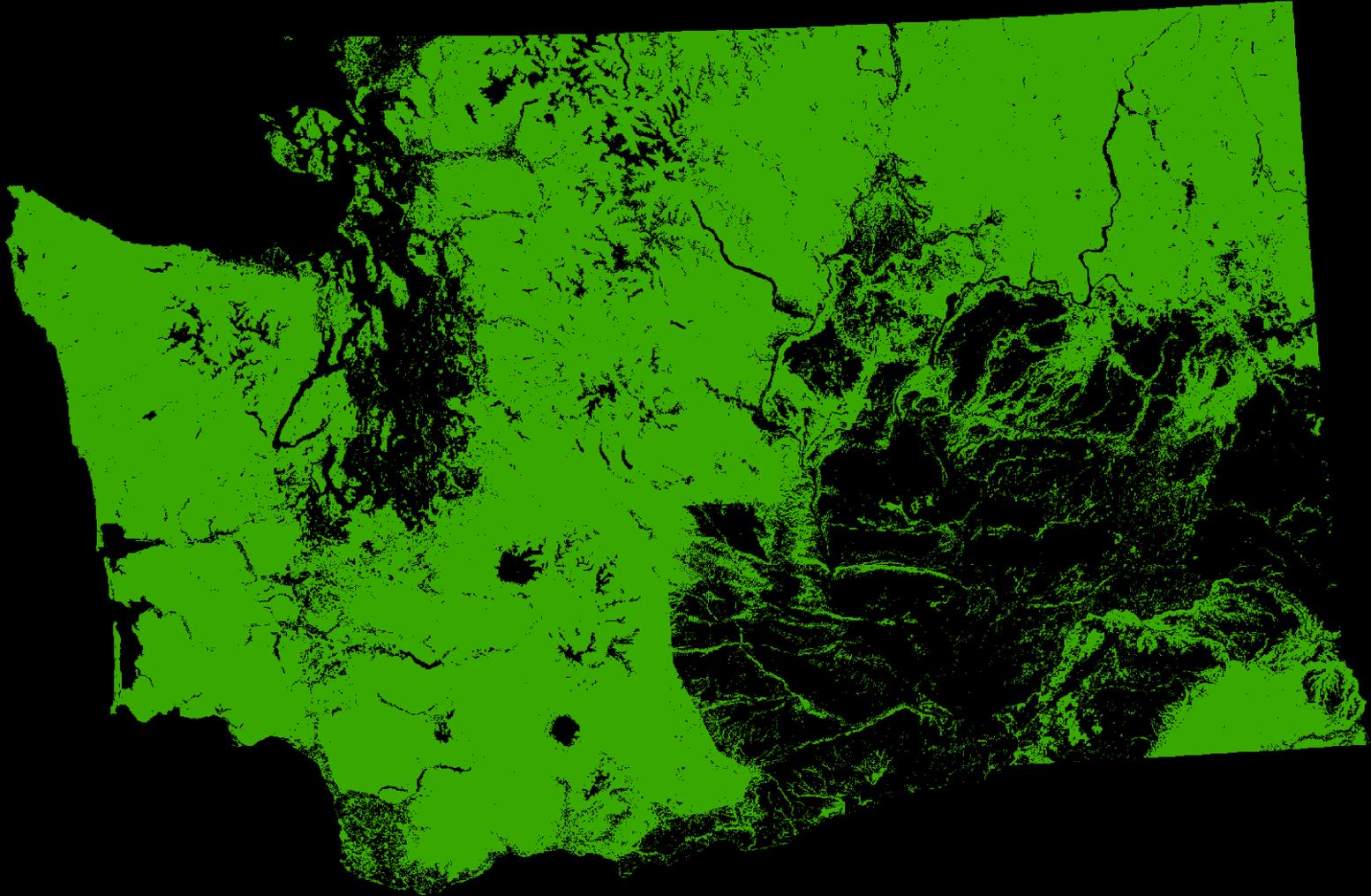


Study Area	# Years	# Cougars*	Study Area (km2)
Makah	4	17	1,061
Westside	10	64	3,500
Cle Elum	8	46	1,652
Okanogan	10	77	1,797
Biopsy	10	133	2,878
Wedge	6	57	735
Selkirk	5	52	5,600
Blue Mtns	5	33	384
total	58	479	17,607

* Does not include multiple captures of same individual

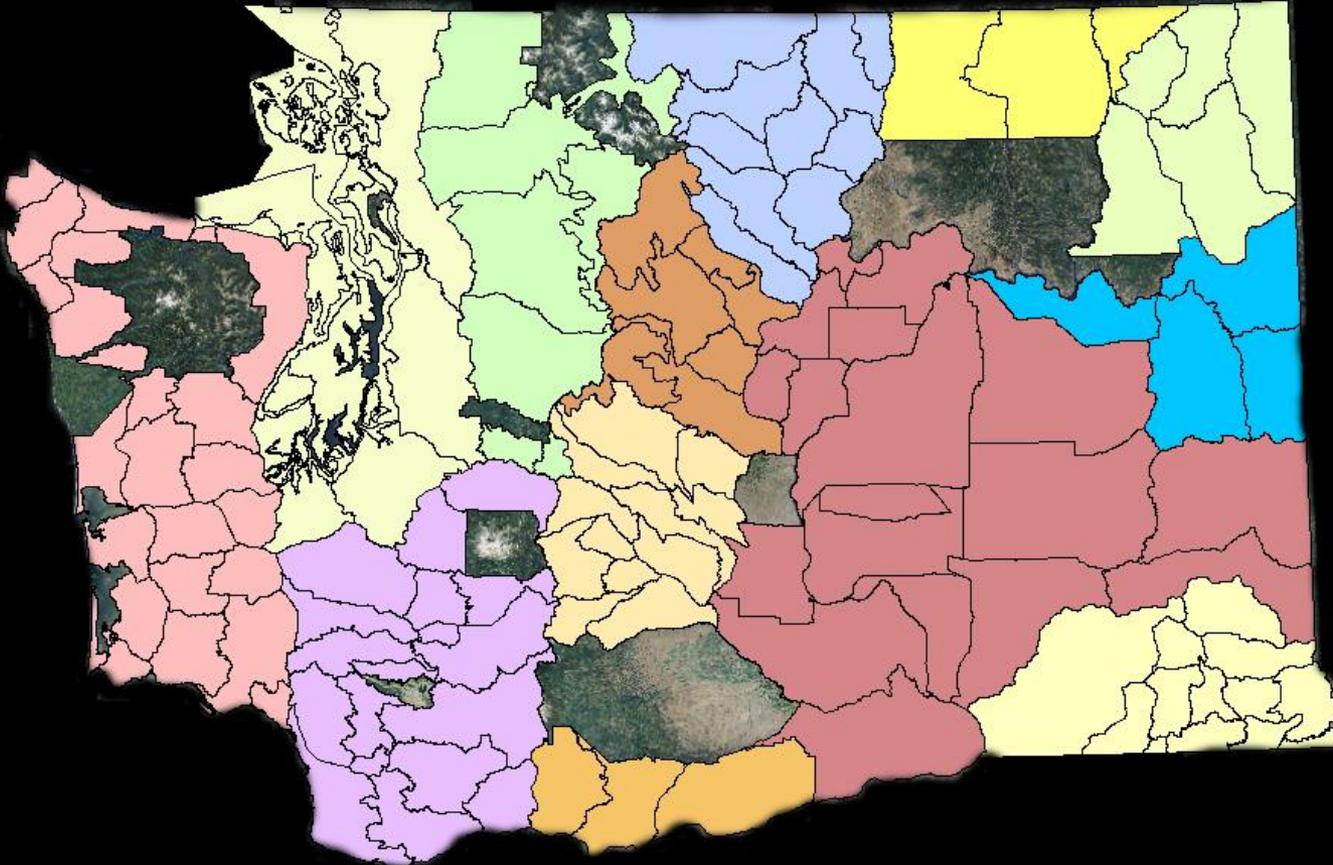


PRODUCTS - NEW STATEWIDE HABITAT ASSESSMENT





ZONE MANAGEMENT 2004-2012



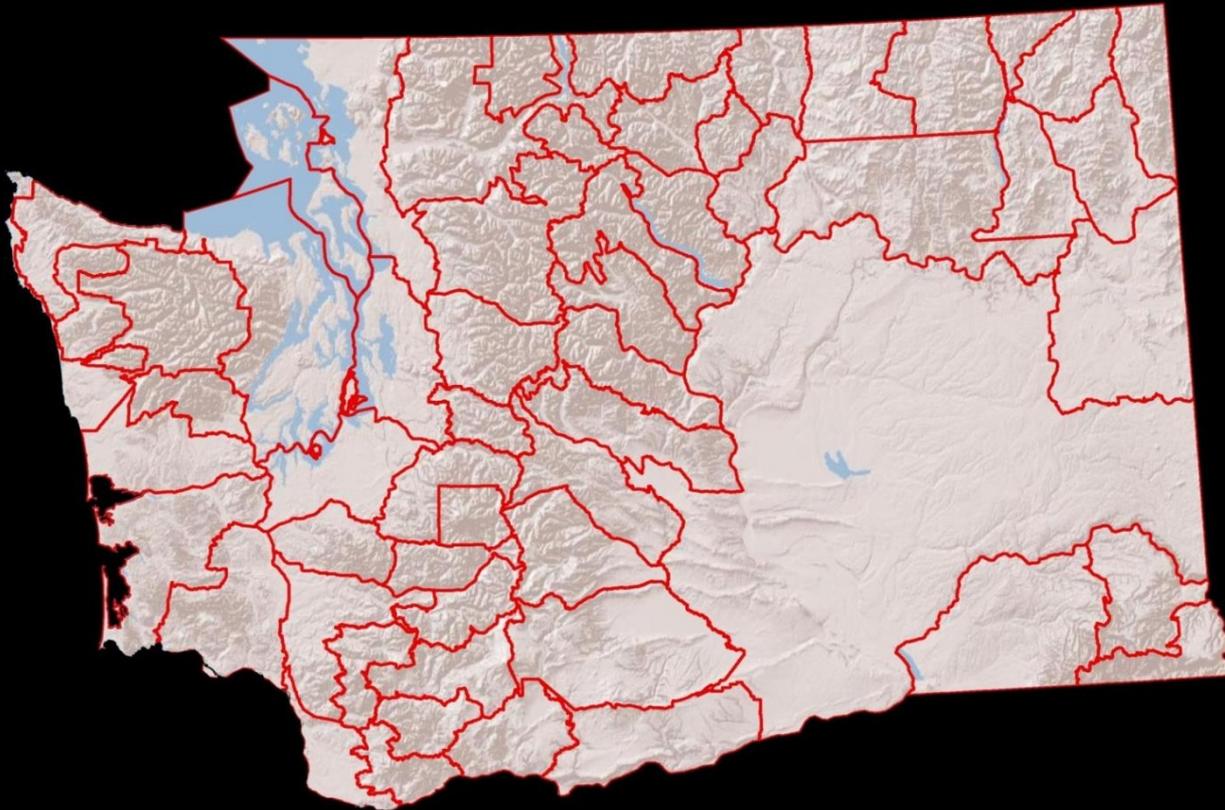
- **13 zones - large-scale geographic areas**
- **Comprised multiple game management units (3-22 GMU's)**
- **Basic geographic boundaries**



PMU MANAGEMENT 2012-CURRENT



- **Since 2012, 50 PMU's were created (1-4 GMU's)**
 - **Habitat, density, harvest history, access, & people were all considered when creating the boundaries**
 - **Reg. staff fine tuned boundaries based on local knowledge**





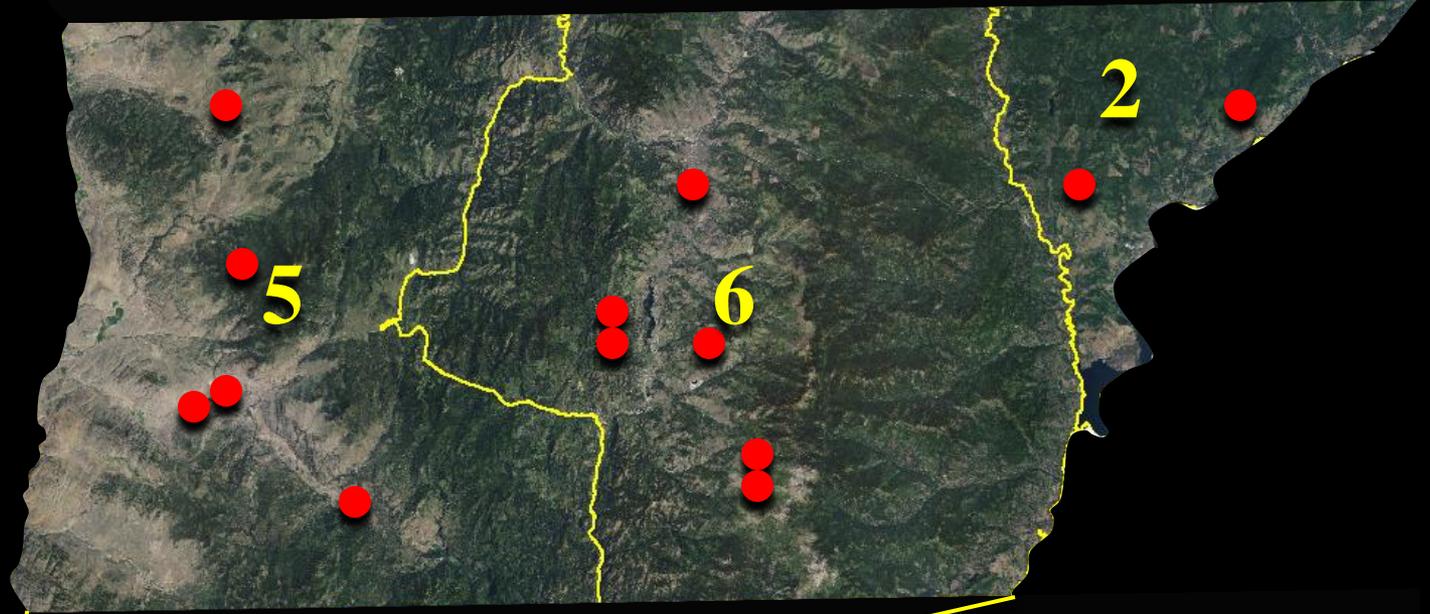
PREVIOUS ZONES = HARVEST CLUMPING



- **High access = inequitable harvest**
- **Harvest clusters \neq social stability**
- **Widespread closures = hunter frustration**



NEW PMU'S = STABILITY & EQUITY



- **Less harvest clusters**
- **Less clusters = preserve territoriality**
- **Smaller closures = hunter satisfaction**



BENEFITS OF PMU's FOR PEOPLE



- **For hunters:**
 - **Older aged animals on the landscape – a better quality hunt**
 - **Harvest is fair & equitable across the landscape**
 - **Not negatively affected by large closures, hunt next door**

- **For non-consumptive user groups:**
 - **Recognizes their values by maintaining the integrity of social structure & ecosystem**

- **For managers:**
 - **Simple for user groups to understand**
 - **Inexpensive to implement**
 - **Scientific and defensible**
 - **Satisfies agency and multi-stakeholder interests**





THE PMU CLOSURE PROCESS



- **There is no closure regardless of harvest prior to Jan 01**
- **Harvest is tallied once per week and 2-3 days notice is given**
- **Telephone hotline & website provide hunters with information**
- **Only hunter kills apply towards the guideline**

Cougar Hunting Area Openings and Closures

Harvest guideline system

In hunt areas with a harvest guideline, the Director may close the cougar late hunting season after January 1 in one or more GMUs if cougar harvest meets or exceeds the guideline.

Starting January 1, cougar hunters may hunt cougar from January 1 until the hunt area harvest guideline has been reached and the GMU(s) is closed by the Director or April 30, whichever occurs first.

All cougars killed by licensed hunters during the early and late hunting seasons, and seasons authorized under WAC 232-12-243 shall be counted toward the harvest guideline.

It is each cougar hunter's responsibility to verify if the cougar late hunting season is open or closed in hunt areas with a harvest guideline. Cougar hunters can verify if the season is open or closed by calling the toll free cougar hunting hotline (1-866-364-4868) or visiting this website.

The hotline and website will be updated weekly beginning January 1, 2016.

Information last updated: *November 4, 2015*

Three things to know

1. Anticipated closures are not official until considered and approved by the director of WDFW.
2. Hunters can also verify closures by calling the toll-free cougar hotline (1-866-364-4868, press 2 after the recording).
3. After January 1, 2016, all hunters must report their kills via the cougar hotline within 24 hours (press 3 after the recording), and kills must be sealed by WDFW staff within 5 days (unfrozen)



AGENCY USE OF HARVEST GUIDELINES



- **WDFW uses the term harvest “guidelines” rather than “quotas” or “limits” because**
 - **a quota connotes a target rather than a threshold**
 - **a limit connotes a maximum rather than a guideline**

- **Of 13 western states that manage cougars**
 - **12 (92%) use harvest guidelines**
 - **All (100%) have mandatory inspection / sealing protocols**
 - **11 (85%) use a telephone reporting / info hotline**
 - **All but WA have a 24-hour closure notice**



THE 12-16% HARVEST GUIDELINE



- **Some confusion with the concept including:**
 - “high” vs “low” harvest areas
 - male vs female harvest %
 - adult vs subadult harvest %
- **High vs low harvest in manuscripts discussed the 2 ends of the spectrum, we needed to find the “sweet spot”**
 - **When hunting & territorial effects were removed, the intrinsic growth rate was 14% (± 2) in both populations**
- **Rate of growth = the rate at which a population would increase with no hunting and no territoriality effects**
 - **Mortality > growth rate = population decline (“high” vs “low”)**



THE 12-16% HARVEST GUIDELINE



- **All sex and age classes are treated the same with the intent of preserving social structure & replacement (kittens not included)**

- **Each sex & age class contributes to population structure**
 - **For each cohort (1yr, 2yr, 3yr...) higher removals of 1 age class is carried into subsequent age classes for years**

- **PMU's have resulted in well mixed sex & age classes in harvest**

- **This strategy is based on equilibrium, harvesting at or below the rate of growth is the goal**
 - **below \neq population increase due to territoriality effects**



THE 12-16% HARVEST RATE



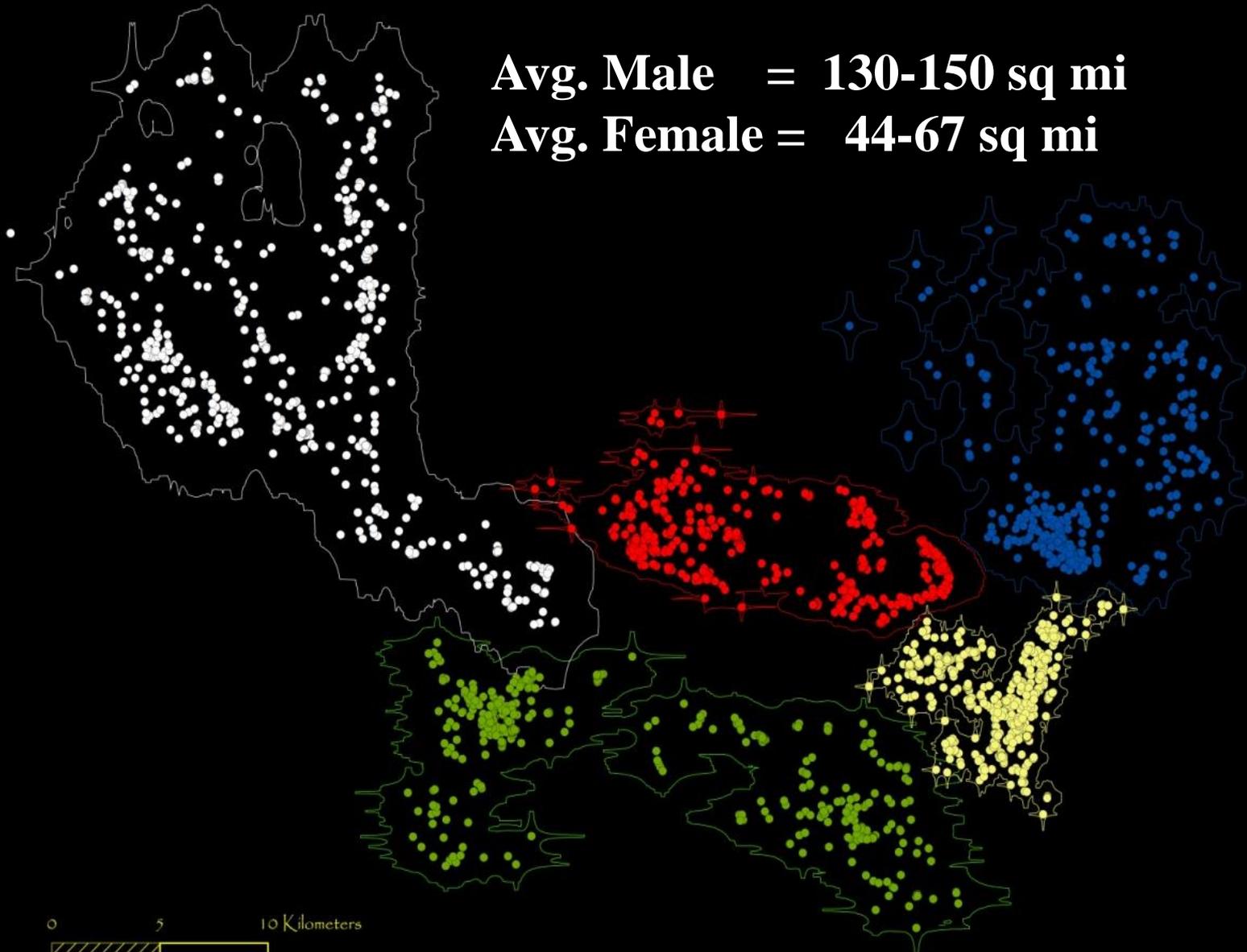
- **3 additional studies have since validated the 12-16% results**
 - **Robinson et al. 2014 (MT, 12% growth rate)**
 - **Logan et al. 2015 (CO, ↓ population @ 15.5% harvest)**
 - **Beausoleil et al. 2016 (WA, ↓ population @ 14% harvest, 7-21%)**
- **Important to note that only hunting mortality applies towards the harvest guideline in WA**
 - **All other mortality is recorded but does not apply**
- **WDFW's structure allows district staff the flexibility of using 12, 14, or 16% hunter harvest based on total mortality & age class of kills**



COUGAR HOME RANGE SIZE



Avg. Male = 130-150 sq mi
Avg. Female = 44-67 sq mi



COUGAR SOCIAL STRUCTURE



Transients

Offspring

Offspring

Female

Resident

Adult Male

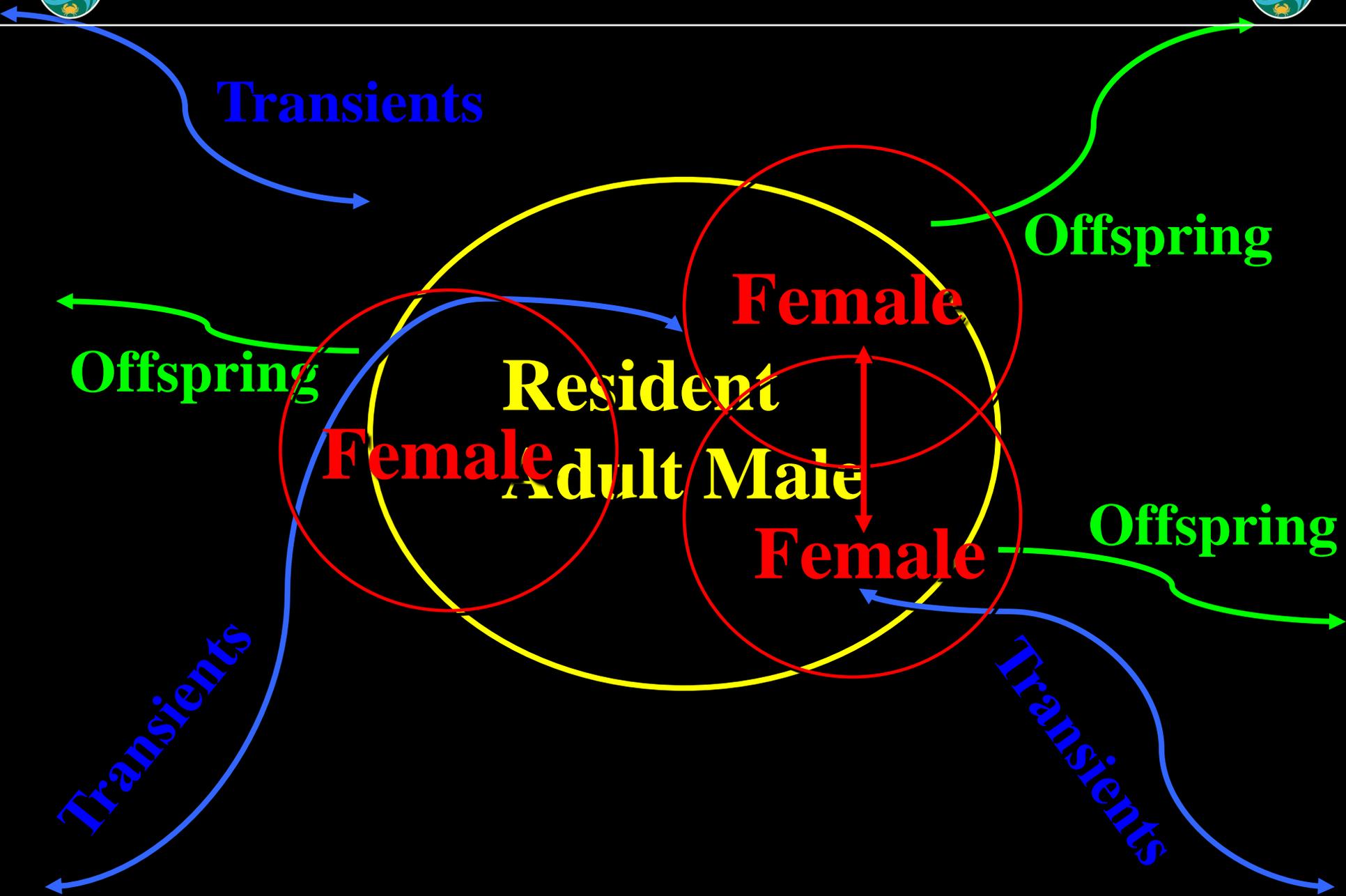
Female

Female

Offspring

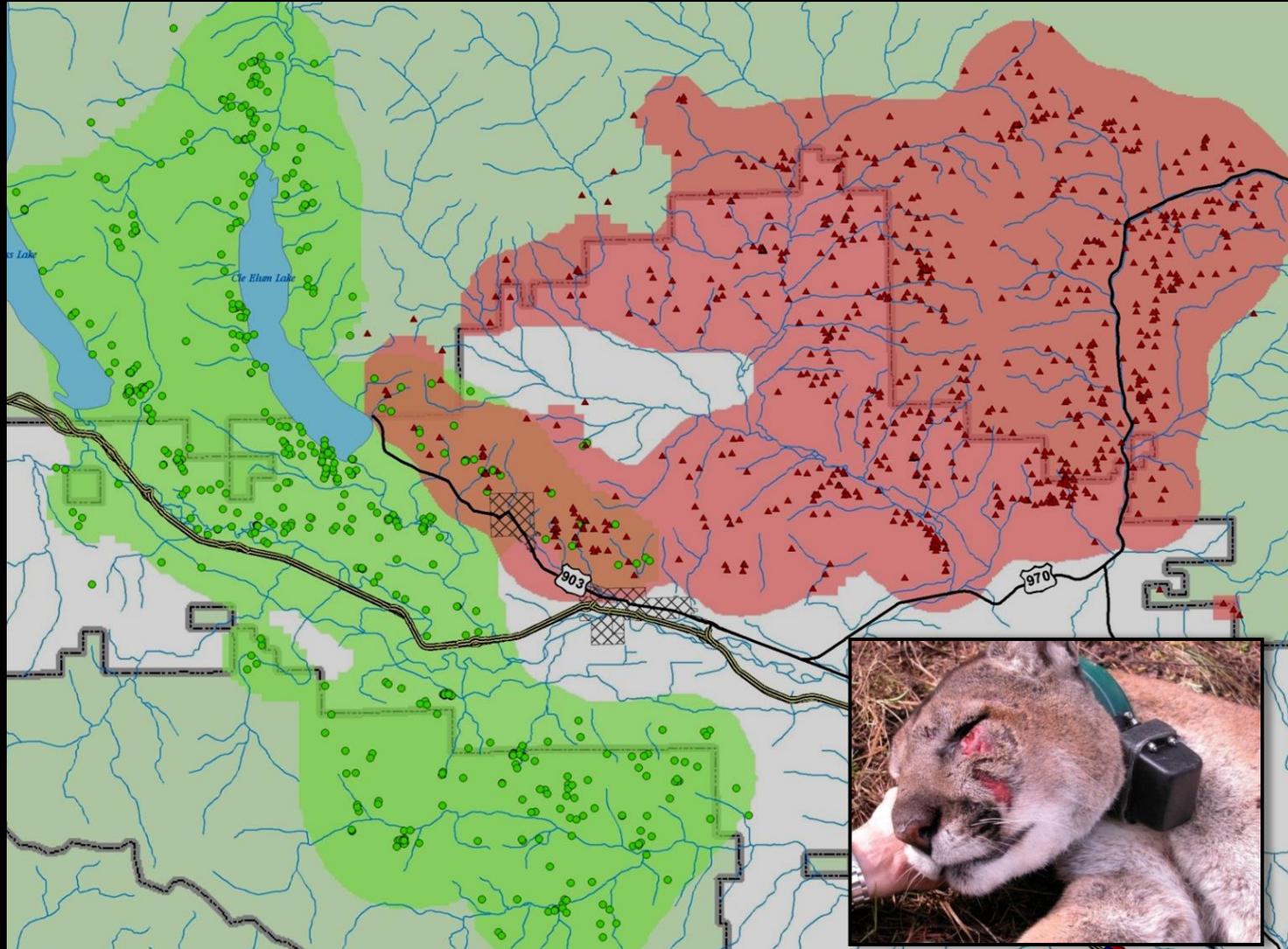
Transients

Transients





COUGAR TERRITORIALITY

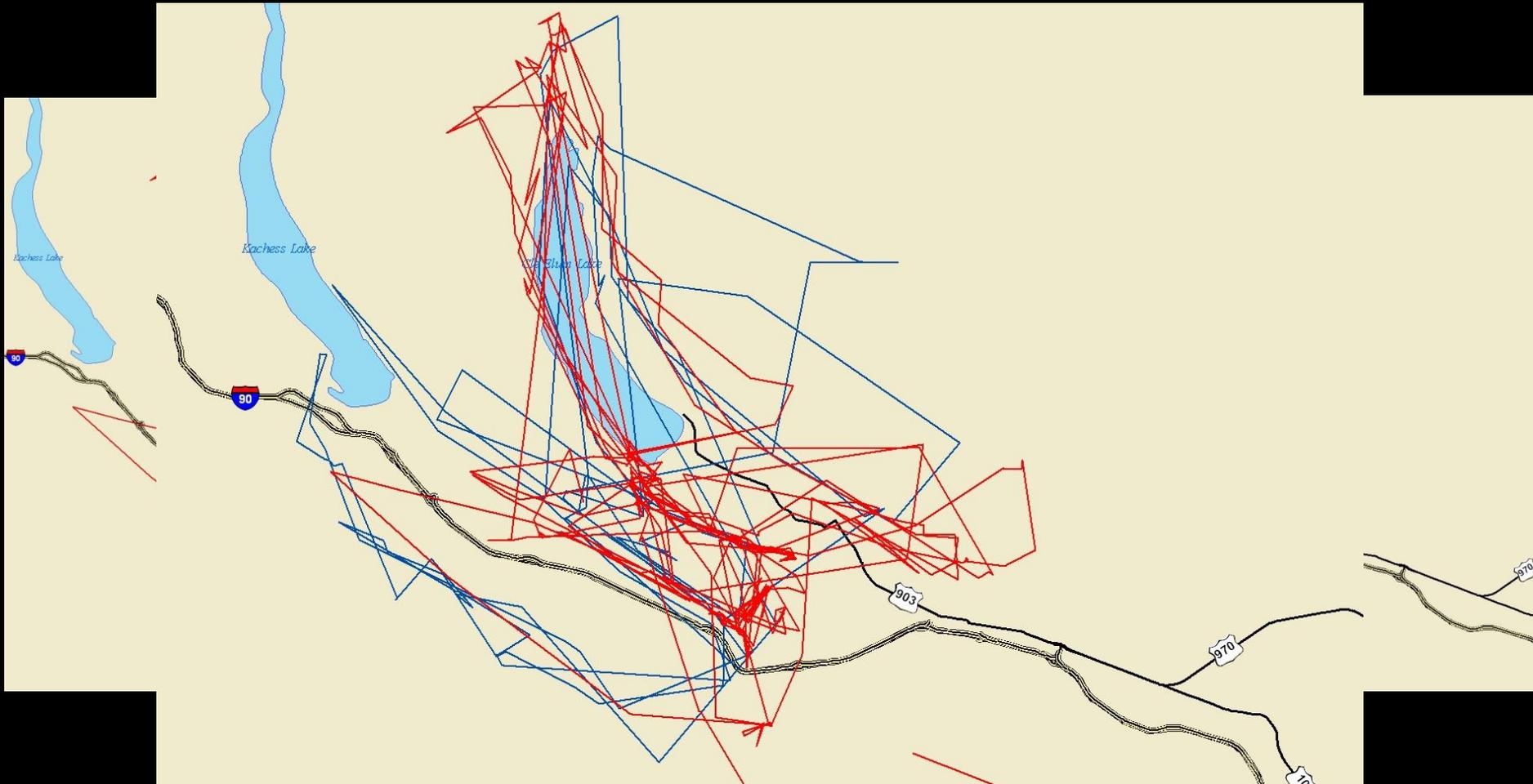




COUGAR TERRITORIES



- **Males are border patrol agents....and HR boundaries are used by their replacements**



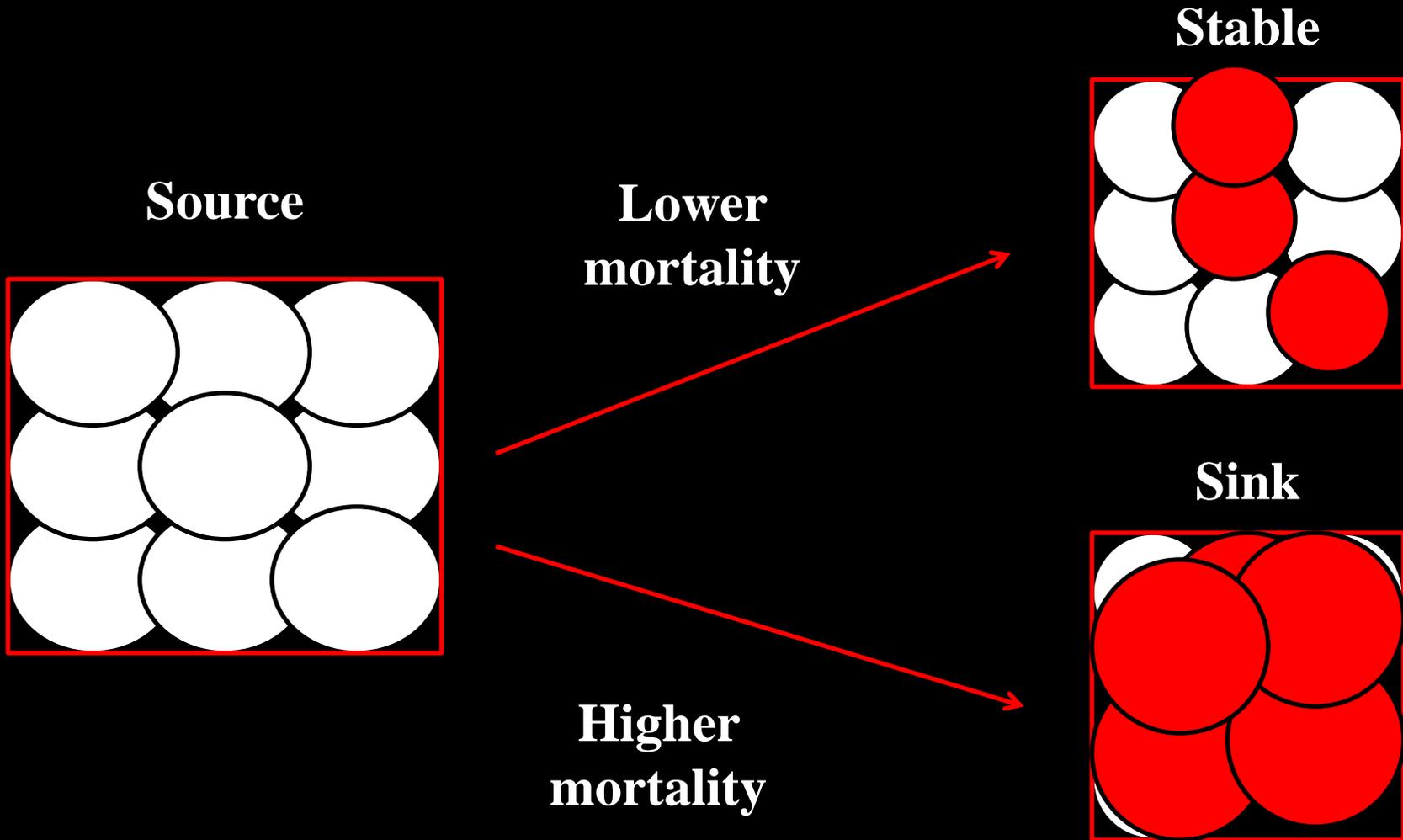


COUGAR TERRITORIAL MARKERS





MALE SOCIAL BEHAVIOR



- **Density can be the same in these scenarios. Not just hunter kills....all mortalities affect this structure**



EFFECTS OF HIGH HARVEST



➤ Although local population sinks may be re-populated by immigration of subadults, high harvest can lead to:

- ✓ breakdown of territoriality
 - ✓ increased HR size & overlap
- } perception of population increase

➤ Demographic changes:

- ✓ younger age structure
- ✓ reduced adult females
- ✓ increased kitten mortality



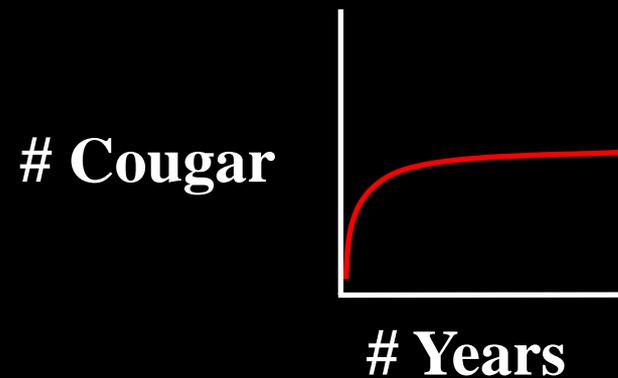
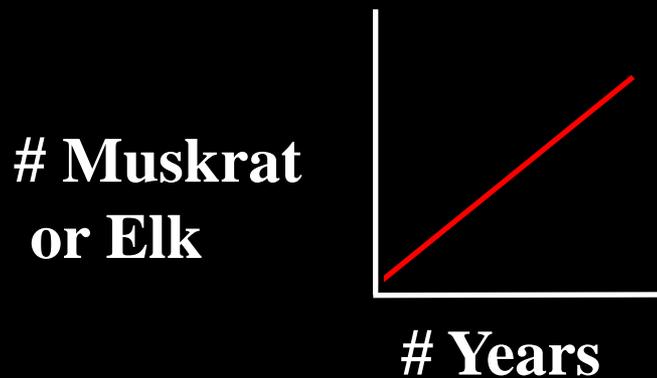
➤ May create unanticipated consequences, including an increase cougar-human interactions



DENSITY DEPENDENCE



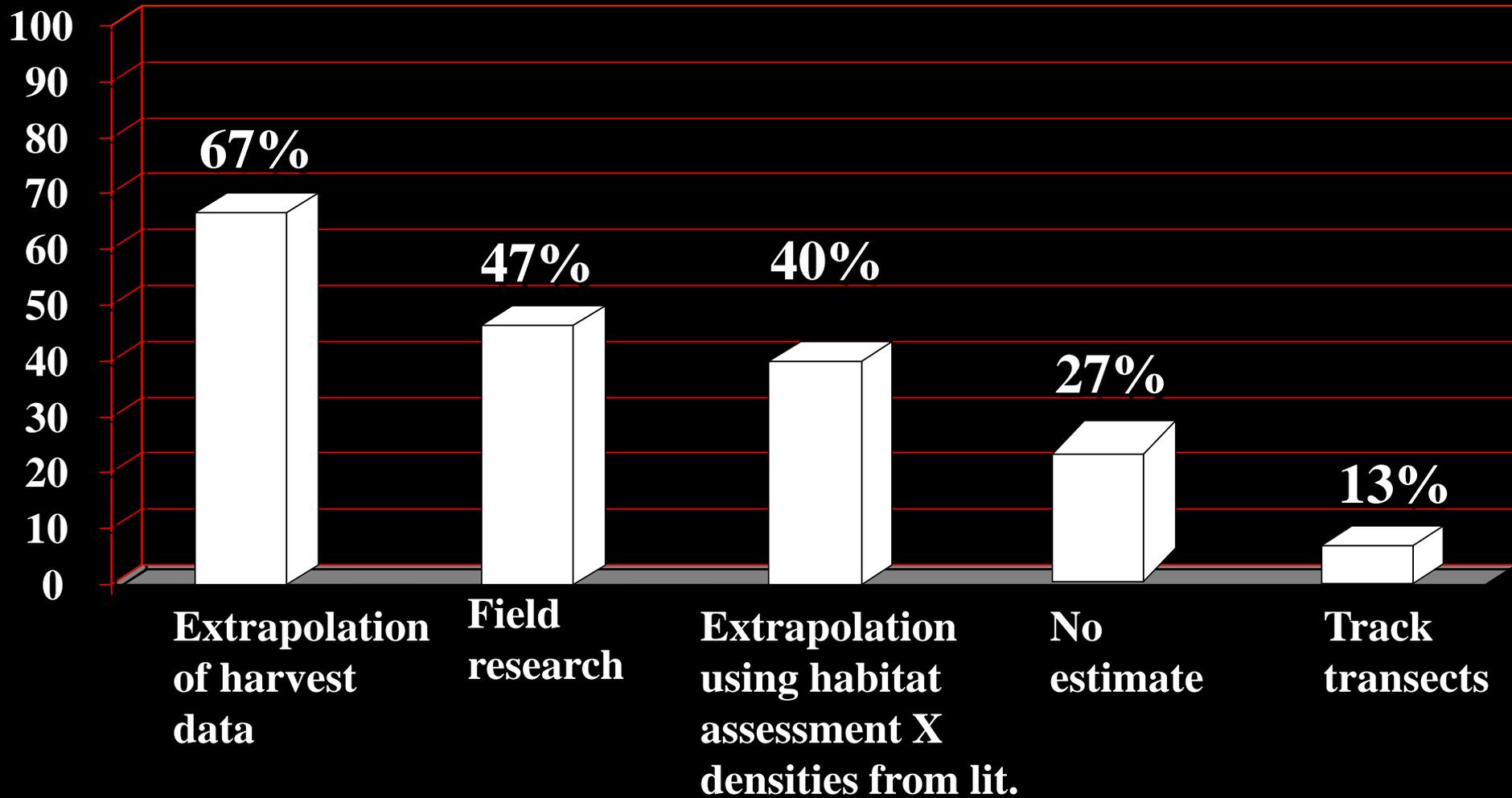
- Because of territoriality, cougar populations are not analogous to muskrat populations, there is a ceiling to growth potential



- # 1 natural cause of death to cougars are other cougars
- density dependent



WHY AGENCY DENSITIES DIFFER





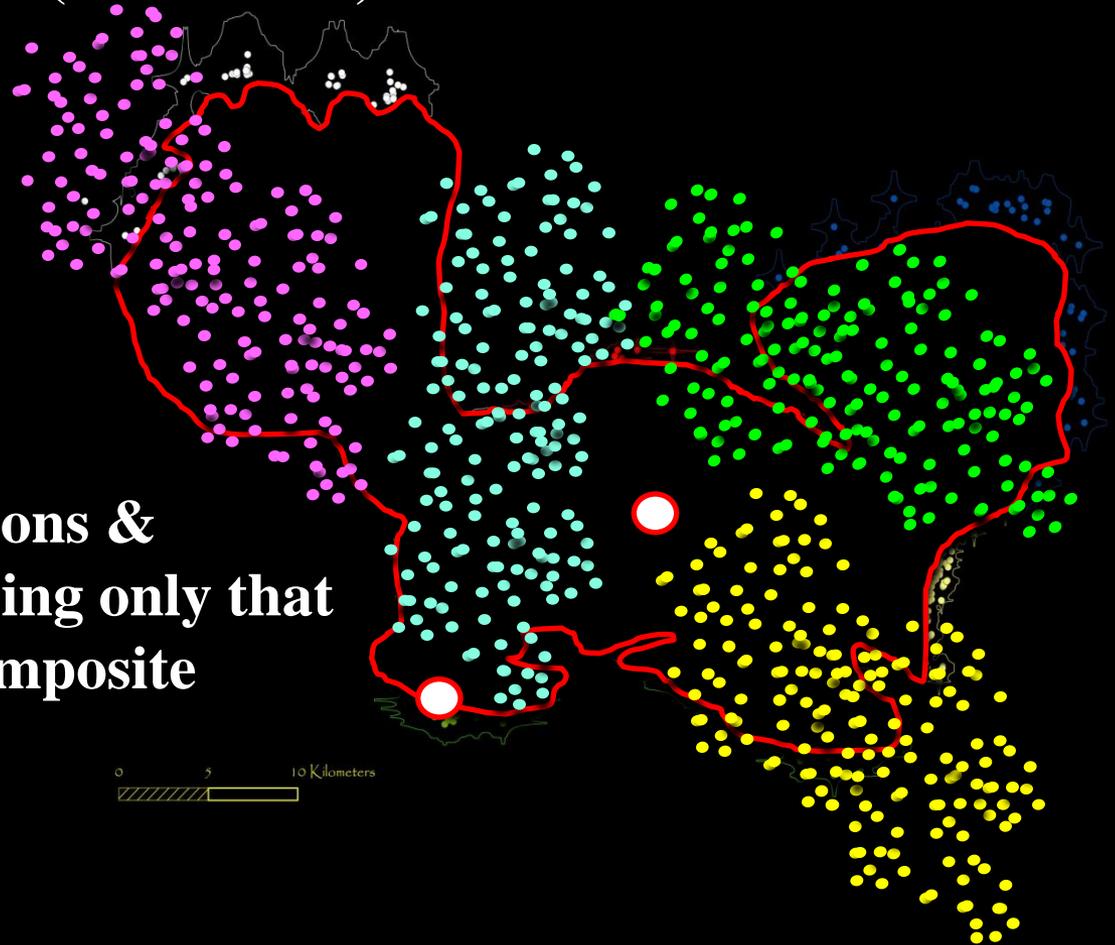
STANDARDIZED DENSITY ESTIMATION



➤ Using GPS data locations, create a 95% female composite for female density calculation (annual HR)

➤ Calculate female density within the composite (e.g. 1.3/100km²)

➤ Overlay male GPS locations & calculate male density using only that portion within female composite (e.g. 0.7 & 0.6/100km²)



➤ Plot harvest by sex & apply avg. density of collared animals by sex



LONG TERM DENSITY = CONSISTENCY



Modified from Quigley and Hornocker 2010		
Location	Reference	2 yr. + Density per 100km ²
NM	Logan & Sweanor	1.5
AB	Ross & Jalkotzy	1.9
BC	Spreadbury	1.0
Vancouver	Wilson	1.7
ID	Seidensticker	1.4
MT	Robinson & DeSimone	1.8
Yellowstone	Murphy & Ruth	0.9
Jackson	Quigley & Craighead	1.3
UT	Lindzey, Stoner & Choate	1.5
WY	Logan	(1.5)
WA	WDFW-WSU-UW	2.0 (18+ months)
CA	Hopkins	(1.8)



DENSITY & HARVEST RATE - T.H.P.'s



- **Any discussion of harvest rate must first state the foundation of the population estimate used to calculate the harvest rate**
 - **How was density obtained?**
 - **Is estimate local, statewide, or extrapolated from elsewhere?**

- **The density needs to explicitly state whether it is based on total population, > 1 year old, > 18+ months**



- **When harvest rates are applied, it needs to be explicitly stated whether the rate is based on total population, > 1 year olds, > 18+ months**



HUNT STRUCTURE UPDATE



➤ Closures:

- 2012-13 – 35 of 49 PMUs remained open (71%)
- 2013-14 – 36 of 49 PMUs remained open (73%)
- 2014-15 – 41 of 49 PMUs remained open (84%)
- 2015-16 – 34 of 50 PMU's remained open (68%)

➤ Distributing harvest across the landscape is working

- Areas with typically low harvest are increasing
- Region 4 had an average of 2-4 harvests /year for a decade
 - In 2015-16 there were 19

➤ Opportunity

- Current harvest guideline is 241 (205-277)
- A harvest of 241+ occurred 4 times since 1980



% HARVEST RATES IN CLOSURE AREAS



Region	Hunt Area	2012-13	2013-14	2014-15	2015-16
1	101			18	
1	105	16	16	32	
1	108, 111	16	16	19	21
1	113			16	
1	117	18	24	24	20
1	121	19		20	
1	124, 127, 130	14			
1	145, 166, 175, 178	28	24	28	28
1	149, 154, 162, 163	27	27		19
1	169, 172, 181, 186	16	16		16
2	204				14
2	209, 215	14			14
2	233, 239				16
2	249, 251	16			
3	328, 329, 335	20	19		18
3	336, 340, 342, 346	18	16		18
3	352, 356, 360, 364, 368		16		16
3	382, 388	16	40		16
4	466, 485a, 490		14		
5	516		14		
5	564, 568				16
5	572				14
5	574, 578		16		16
6	642, 648, 651	20	14		
6	667			28	14

Northeast

Blue Mountains

Kittitas / Yakima

Olympia Peninsula



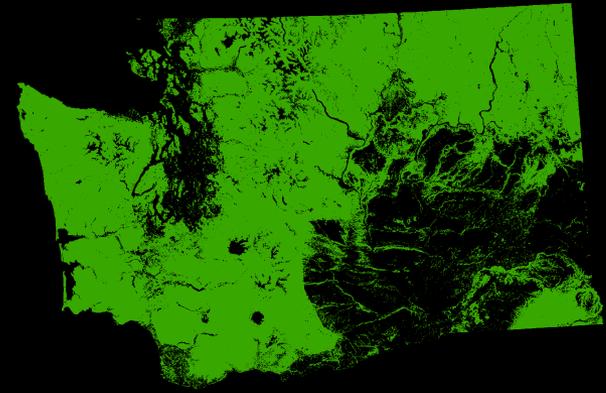
UNCERTAINTY IN WDFW MGMT



- **Tribal harvest (in GMUs) & unreported kills are not included in harvest guidelines**
 - **Undocumented harvest is higher in R1, R3, R4, R6**

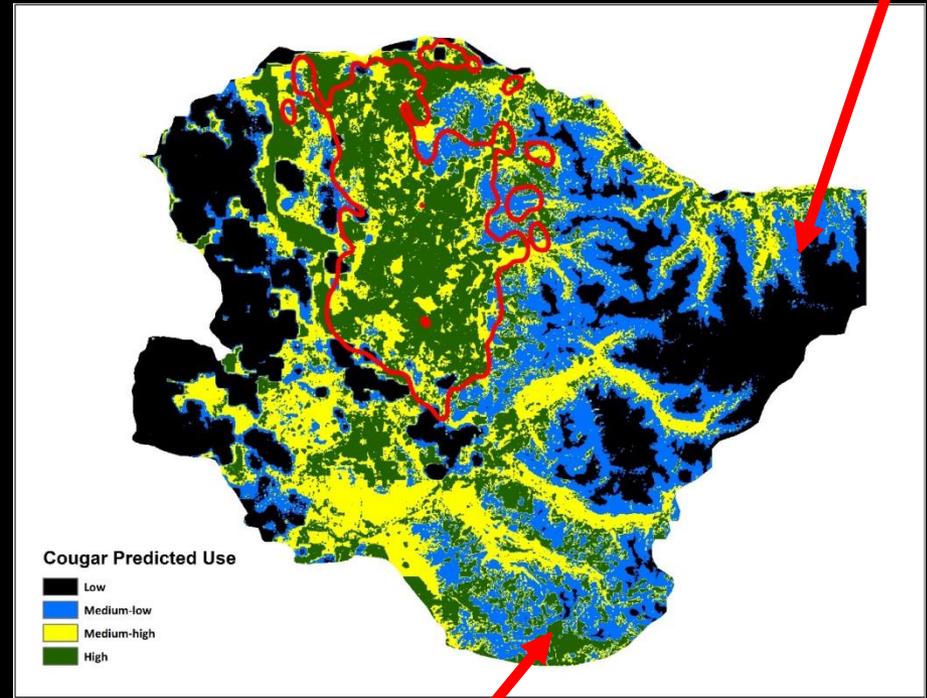
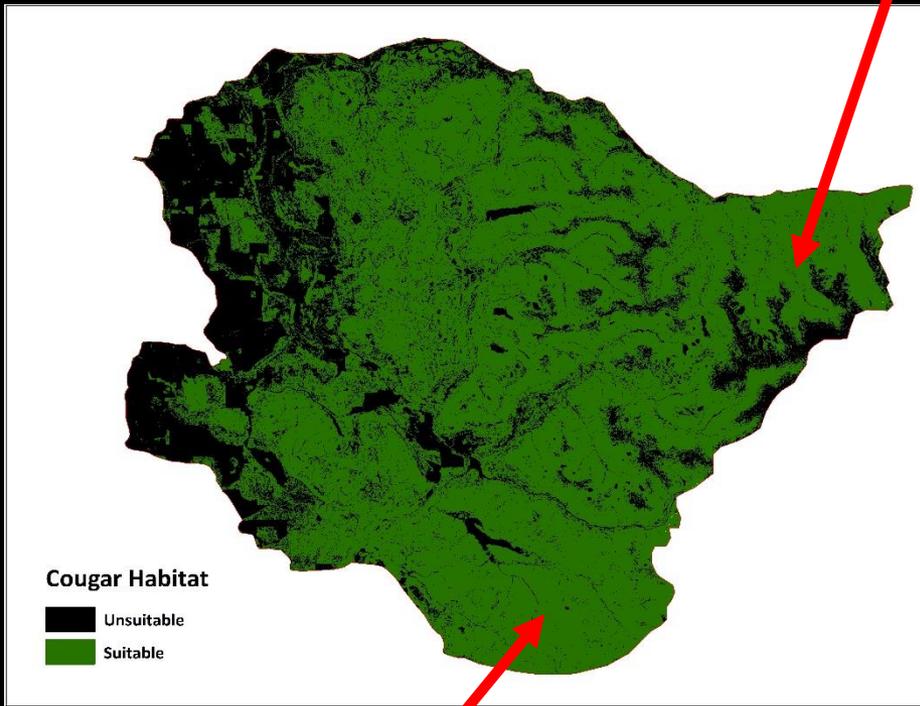
- **Early hunt season has no guideline**
 - **Guidelines can be met/exceeded**

- **Habitat Map**
 - **We used binary code (0 or 1)**
 - **Not all habitat quality is equal**
 - **Density found in research study areas may not be representative**
 - **work conducted in highest quality habitats**





COUGAR HABITAT EXAMPLE



- Potential to over-estimate cougar population size and allowable harvest within the PMU



RESEARCH TEAM



R. Beausoleil

H. Cooley

J. Cymerman

C. Grue

G. Koehler

C. Lambert

J. Keener

B. Kertson

B. Maletzke

J. Marzluff

D. Martorello

D. Morrison

K. Peebles

J. Pierce

J. Richard

H. Robinson

R. Spencer

M. Swanson

K. Warheit

R. Wielgus

K. White

**Acknowledgements: WDFW field staff
WDFW Wildlife Program
Washington State University
University of Washington
WDFW Commission**



COUGAR – WORLD CLASS SPECIES

